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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/901,526	07/09/2001	Matthias Forster	INF-1078	7099

24131 7590 03/07/2005

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EXAMINER	
MULPURI, SAVITRI	
ART UNIT	PAPER NUMBER
2812	

DATE MAILED: 03/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/901,526	FORSTER ET AL.	
	Examiner	Art Unit	
	Savitri Mulpuri	2812	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12/20/2204*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *12-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) _____ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

This action is in response to the applicant's communication, affidavits, filed on 12/20/2004.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 12-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thakur et al (6,187,628) in combination with Lin et al (US 5,930,625) and Schaefer et al (US 5,943,571)

Thakur et al discloses a method of growing silicon layer with micro-roughness of hemispherical growth by the following process steps: Providing a substrate "12"in a chemical vapor deposition process chamber, growing polysilicon layer "16" over the substrate; growing thin oxide layer '18"; generating process gas containing semiconductor material to grow a rough polysilicon layer "20" in in-situ chemical vapor disposition. Thakur teaches without annealing the rough silicon layer "20", growing dielectric layer "20". Thakur et al grows silicon layer in single growth step exactly similar to what is claimed in instant process. Thakur et al discloses providing silane gas at growth temperature 500-700 C and

pressure in the range of 70 mTorr to 50 Torr, which includes claimed range (100mTorr to 600mtorr) to produce rough polysilicon with the thickness in the range of 300 angstroms to 1000 angstroms (see fig.1 and col.3, lines 23-47). Thakur et al further discloses pre-cleaning the substrate in HF prior to growth to inherently provide oxide free surface because HF etches natural oxide deposited on silicon substrate surface (see col.2, lines 7-8). Thakur et al discloses the whole process is applied to form either trench or stacked capacitor for DRAMs (see col.1, lines 24-27). Thakur et al teaches a method of making rough polysilicon in single growth step without annealing step at similar growth conditions as growth conditions recited in instant claimed invention. However, Thakur et al do not teach hydrogen/silane or nitrogen/silane ratio to grow rough polysilicon. Thakur et al discloses forming hemispherical grains in LPCVD on silicon oxide layer "18" using helium diluted silane (20 %) gas.

Lin et al et al discloses forming hemispherical grains with clear spacing in between grains in LPCVD by using either nitrogen at a pressure less than 1 Torr equal to 133 pa), which is with in the claimed range, at a temperature in the range of 550 to 580 C with silane or disilane with a concentration below 1 E 10^{-3} /molecules/m^3, which is heavily diluted with nitrogen(see col.5, lines 2-15). It would have been obvious to one of ordinary skill in the art to form grains with clear spacing to have higher degree of roughness to result more surface area and in turn capacitor with high capacitance for DRAMs.

Lin et al does not mention art recognized equivalent materials of inert nature of nitrogen or helium during hemispherical grain growth.

Schaefer et al teaches art recognized equivalents of helium or nitrogen to grow spaced apart grains (see fig.1 fig.4 and col.1, lines 41-55). It would have been obvious to one of ordinary skill in the art to grow spaced apart grains using nitrogen as alternative to helium in the invention of Thakur because Schaefer et al teaches art recognized equivalents of He and nitrogen as a carrier gas to grow grains.

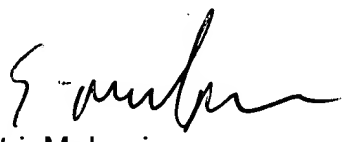
The affidavit filed on 12/20/2004 under 37 CFR 1.131 is sufficient to overcome the Aiso et al reference.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Savitri Mulpuri whose telephone number is 571-272-1677. The examiner can normally be reached on Mon-Fri from 8 to 4.30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Micahel Lebentritt, can be reached on 571-272-1873. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through

Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Savitri Mulpuri
Primary Examiner
Art Unit 2812